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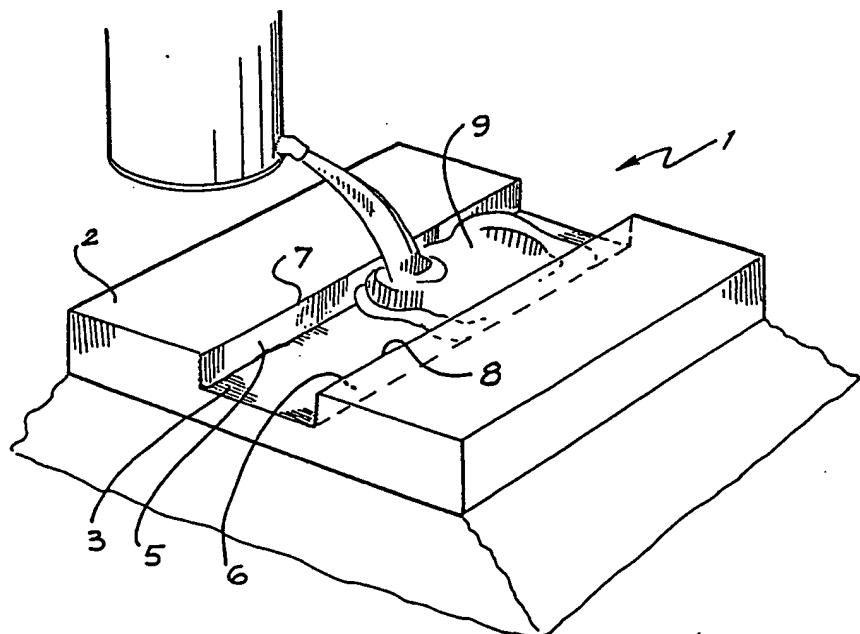
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(54) Title: ROAD AND SIMILAR SURFACE MARKING



(57) Abstract

A method of marking a substrate material comprising the steps of forming a recess (3) in a substrate (2), evacuating the recess (3) of debris to provide a keying surface in the base (4) and wall surfaces (5) and (6) of the recess, filling the recess (3) with a filler material (9) allowing the filler material to set and sealing the filler material (9) with a sealing compound such that the filler material creates a contrasting mark whose durability approximates or betters the durability of the substrate material.

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ROAD AND SIMILAR SURFACE MARKING

The present invention relates to an improved method of marking of surfaces, in particular, though not limited to ground surfaces such as roads and concreted areas.

5 Surface Marking is a necessary requisite for dividing and delineating roadways and delineating car spaces in carparks. This type of Marking is also employed for delineation in tennis and basketball courts and in pedestrian crossings in roadways.

10 As line marking is often applied on surfaces which will be subject to excessive wear it is essential that a method be used which will provide a durable line surface for an indeterminate but lengthy period of time.

15 There are presently in use a number of methods of linemarking, perhaps the most common being the use of paint to form the lines on the surface to be delineated.

20 When roads for instance are delineated with a centreline this is usually done by painting within a space defined by a template which forms the periphery of the said space. Alternatively, paint can be sprayed directly onto the surface from a reservoir mounted on a vehicle without the need to utilise a template.

25 A similar method can be used when pedestrian crossings are prepared with markings. Some road markings especially pedestrian crossings and intersection markations have been prepared using strips of a resilient material mounted on top of the road surface.

30 This latter form of line marking suffers from the disadvantage that it is very prone to wear as the top edges of the material are not flush with the road surface. This being the case the edges of the resilient material sit proud of the road surface and present a point for lateral impact from tyres of vehicles. Thus the material gradually becomes eroded from these effects.

35 It has been found in the past that lines produced using both of the aforesaid methods show signs of wear after a relatively short period of time.

This necessitates repeated applications of the

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material used in the marking, which increases costs in the long term due to the material and labour costs in continually replacing the markings on a surface and also creates disruption to traffic many more times than should be the case when the replacement marking is carried out.

It has also been found in the past that the paints which have been used for surface marking, although they are formulated to be hard wearing, are also vulnerable to the effects of oil and petrol spills and also to the effects of acids and other chemicals.

Furthermore, accelerated weathering of these points takes place in areas of moderate or high rainfall.

It has therefore been found necessary to develop an improved method of surface marking which will overcome the above problems and provide a method of line marking using a resilient and durable filling material which will last indefinitely and be more economical, in the long term, than the prior art materials.

To be effective, the marking material must be able to withstand continuous cyclic loading imposed by vehicular and/or pedestrian traffic and it must be able to withstand cyclic weathering and the effects of high temperatures and harsh chemicals.

The present invention seeks to achieve these aims by providing a once only permanent marking for a multiplicity of surface materials.

In its broadest form the present invention comprises a method of marking a substrate material comprising the steps of:

- 30 (a) forming a recess in the said substrate material;
- (b) evacuating the recess so formed of contaminants and debris to provide a clean keying surface within the said recess;
- (c) applying a resilient weather resistant material which contrasts with said substrate to fill the said recess and to adhere to the said keying surface within said recess; and
- (d) allowing said resilient filler material to set;
- (e) sealing said filler material with a sealing

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compound; wherein, when said resilient filler material sets a contrasting marking is created in the substrate material the durability of the said filler material approximating or bettering the durability of the said substrate material to enable permanent marking of said substrate.

5 In the preferred embodiment the filler material comprises an epoxy resin.

Also, the preferred embodiment the recess is formed by routing and is carried out using a specially machined routing bit attached to a conventional cutter suitable for thus purpose.

10 The recess can be prepared in a variety of surfaces ranging from the bituminous materials such as macadamised surfaces to stone or concrete surfaces. The recess is dimensioned according to a specified shape, length, width and depth, these specifications being commensurate with the dimensional requirements of the particular marking job to be done.

15 The recess when formed is cleaned by known methods and the base of the recess is roughened to provide a keying surface for the filler material.

20 In the preferred embodiment, the filler material is a resilient long lasting and durable epoxy material which is poured in liquid form under gravity and which is self levelling.

25 The preferred composition of the filler material includes a glycidyl-ether of di-phlnylo propane and glclo aliphatic-polyamine. The filler also contains a fade resistant pigment.

30 The invention will now be described in detail according to a preferred, but non limiting embodiment, wherein:

35 Fig. 1 shows an isometric view of an increment of a surface material prepared with a recess to receive a filler material with a portion of the recess filled with the filler material;

Fig. 2 shows an increment of a surface with a delineation as completed; and

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Fig. 3 shows a series of cross sectional view of a surface with alternative shapes for the recess.

Referring to Fig. 1 there is shown an element 1 in isometric view of an artificial ground surface medium material which is undergoing filling by a filler compound and which has been partially prepared with lineation.

Preferably, this lineation is prepared on an artificial ground surface material 2 which can be any of a number of materials such as those forming a road, tennis court, basketball court, carpark or the like.

The preferred materials for the artificial ground surface are bituminous or concrete materials for which machines are available to cut recesses therewithin. However, it is conceivable that the methodology and material of the present invention could be employed in delineation of firm natural ground surfaces if required. The method could also be applied to timber surfaces.

The unique method of linemarking of the present invention commences with the cutting, routing or grinding out of a recess to specified dimensions. The depth and width of the recess can be varied according to need and the expected site and wear conditions for the surface marking including mechanical, chemical and thermal conditions to which line marking material will be subject. The length of the line marking can either be determinate or of unspecified length - the latter usually occurring in road delineation.

As shown in Fig. 1, ground surface material 2 is prepared with recess 3 over the full length of the line. The recess must be prepared with appropriate keying surfaces.

The recess 3 preferably has a base surface 4 and wall surfaces 5 and 6. Ideally these surfaces must be prepared so they are rough and yet clean so the filler material can adhere effectively to these surfaces.

Although it is preferable for the wall surfaces 5 and 6 to be rough, it is wholly desirable that the edges 7 and 8 of wall surfaces 5 and 6 respectively be straight, so that the interphase between the material

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forming the line and the ground surface is neatly defined.

Usually, the nature of the surface material will provide a rough surface when the recess is cut. However, some surface materials such as concrete will present a smooth appearance after cutting.

5 This problem can be overcome by providing a roughened recess cutting tool to ensure that the finished recess surface is suitably roughened.

Once the recess is suitably roughened, all loose material and any contaminants must be cleaned from the recess to ensure optimum adhesion between the filler material and the recess base and walls.

10 With the recess cleaned, the filler material 9 is applied. This filler material is preferably an acid, petrol, water and oil resistant epoxy resinous material which is normally applied in liquid form and which after finding its own level within the recess sets into a hard wearing surface, subsequent trowelling being unnecessary. It is preferable that the resin be 15 permitted to set for 24 hours before loading is applied.

20 Preferably, the recess is filled so that the filler material surface is flush with or sits proud of the ground surface. The importance of this feature is that it avoids spalling of the upper corners of the recess 25 walls, which would be the case if the surface of the filler material was recessed below the ground surface.

The rough surfaces of the recess provide shear resistance at the interphase between the filler material and the recess walls when lateral or longitudinal loads 30 are imposed on the filler material during everyday use either by vehicles or pedestrians.

35 The size of the recess is proportioned according to the dictates of the conditions to which the surface marking will be subject, for instance, the preferred economical depth of the filler material is approximately three millimetres and this depth is adequate for most applications.

This depth has been found to be a suitable compromise between wear resistance and durability and

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economics. A thicker coating can be employed with a resultant increase in cost per metre where conditions demand, however, due to the extreme hardness and high abrasion resistance of the preferred resinous filler material, a thickness of greater than three millimetres is in most cases unnecessary, even where vehicular traffic is expected to impact the marking.

The result of the application of the above method to produce delineated surfaces is a durable and long lasting line marking which can be expected to last at least twenty years unlike the prior art delineations which require constant maintenance beginning after three to four years.

It has been found in trials of the method of the present invention with some ground surface materials that when the resinous filler is first applied, some of the filler can seep into the substrate if the substrate is an absorptive material. This results in a drop in the top surface level of the filler material soon after pouring. To compensate for this effect, the resinous filler can be poured in two layers.

The first layer is poured so that its upper surface results in being below that of the artificial ground surface when it sets. A second layer of filler is poured over the first layer to the level of the ground surface creating a flush finish between the upper surface of the filler and the ground surface. It has been found in practise that the second layer adheres well to the first poured layer.

Fig. 2 shows an element of ground surface with the resinous filler material in situ.

In an alternative embodiment, after the surface marking is complete, either side of the marking can be treated with a sealant to help prevent erosion of the ground surface adjacent to the line.

Although the method of the present invention is initially more expensive per metre than conventional line marking methods, in the long term, the economy of the present method over the prior art methods becomes evident

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as repeated maintenance applications are unnecessary.

The prior art methods produce lineation which requires constant maintenance within short periods. This problem has been eliminated in the present invention.

5 It is envisaged that the method of the present invention can have a variety of applications in addition to those previously described. For instance, the lines could be prepared in vertical surfaces or the method could be employed for writing permanent signs in suitable
10 materials.

Alternatively the method can be applied to besser block material or timber materials.

15 The contrast between the ground surface material and the resinous filler material necessary to ensure prominence of the delineation is effected by colouration of the resinous filler material.

20 Fig. 3 shows a variety of cross sectional embodiments of the recess providing alternative keying methods for the filler material. The production of the various cross sections would depend on the type of cutting bit used in forming the recess.

It will be recognised by persons skilled in the art that numerous variations and modifications can be made to the invention as hereinbefore described without departing
25 from the overall spirit and scope of the invention.

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THE CLAIMS:

1. A method of marking a substrate material comprising the steps of:
 - (a) forming a recess in the said substrate material;
 - (b) evacuating the recess so formed of contaminants and debris to provide a clean keying surface within the said recess;
 - (c) applying a resilient weather resistant material which contrasts with said substrate to fill the said recess and to adhere to the said keying surface within said recess; and
 - (d) allowing said resilient filler material to set;
 - (e) sealing said filler material with a sealing compound; wherein, when said resilient filler material sets a contrasting marking is created in the substrate material the durability of the said filler material approximating or bettering the durability of the said substrate material to enable permanent marking of said substrate.
2. A method of marking according to claim 1, wherein the said resilient filler material comprises an epoxy resin in liquid form which sets after prolonged contact with air.
3. A method of marking according to claim 2, wherein the said filler material, when set, approximates the shape of the recess formed in the said substrate material.
4. A method of marking according to claim 3, wherein the filler material is sealed with a low viscosity epoxy sealant.
5. A method of marking according to claim 4, wherein the said keying surface comprises a roughened portion of the substrate material.
6. A method of marking according to claim 5, wherein the keying surface comprises the total surface of the said recess.
7. A method of marking according to claim 6, wherein the marking so formed is a delineation.
8. A method of marking according to claim 7, wherein the substrate material is disposed on a vertical,

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horizontal or sloped attitude.

9. A method of marking according to claim 8, wherein the substrate is a bituminous or concrete material.

10. A method of marking according to claim 9, wherein the substrate comprises stone, clay or like materials.

11. A method of marking according to claim 10, wherein the cross sectional profile of the said recess has sides which outwardly taper from the bottom of the said recess.

12. A method of marking according to claim 11, wherein the cross sectional profile of the said recess has sides which inwardly taper from the bottom of the said recess.

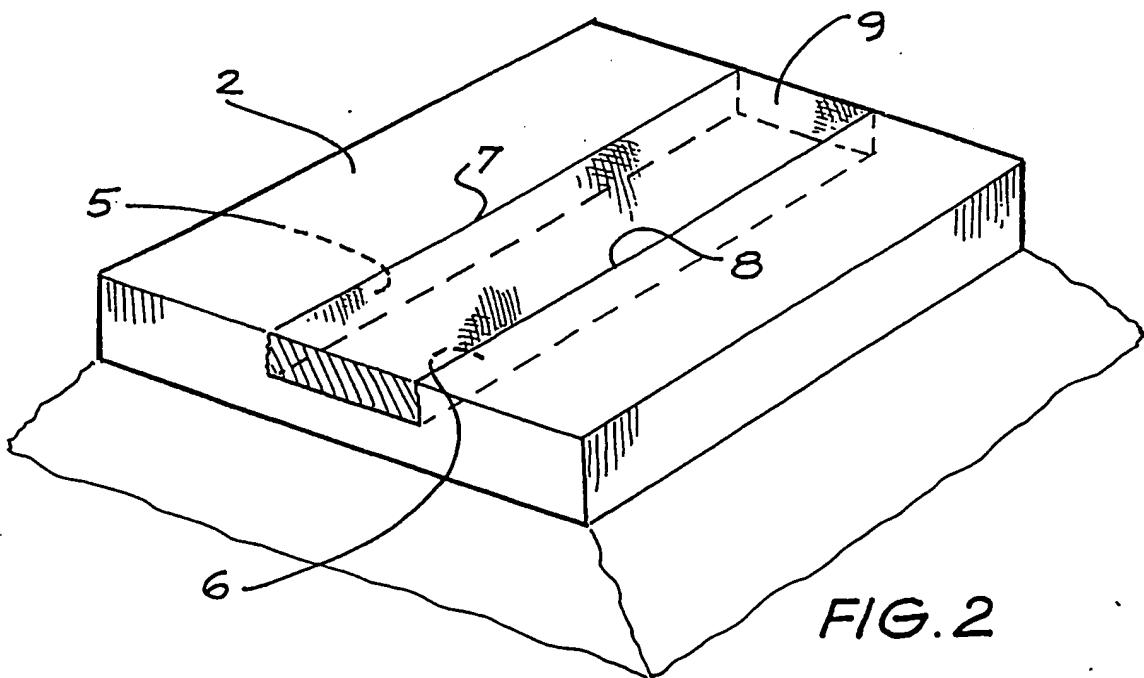
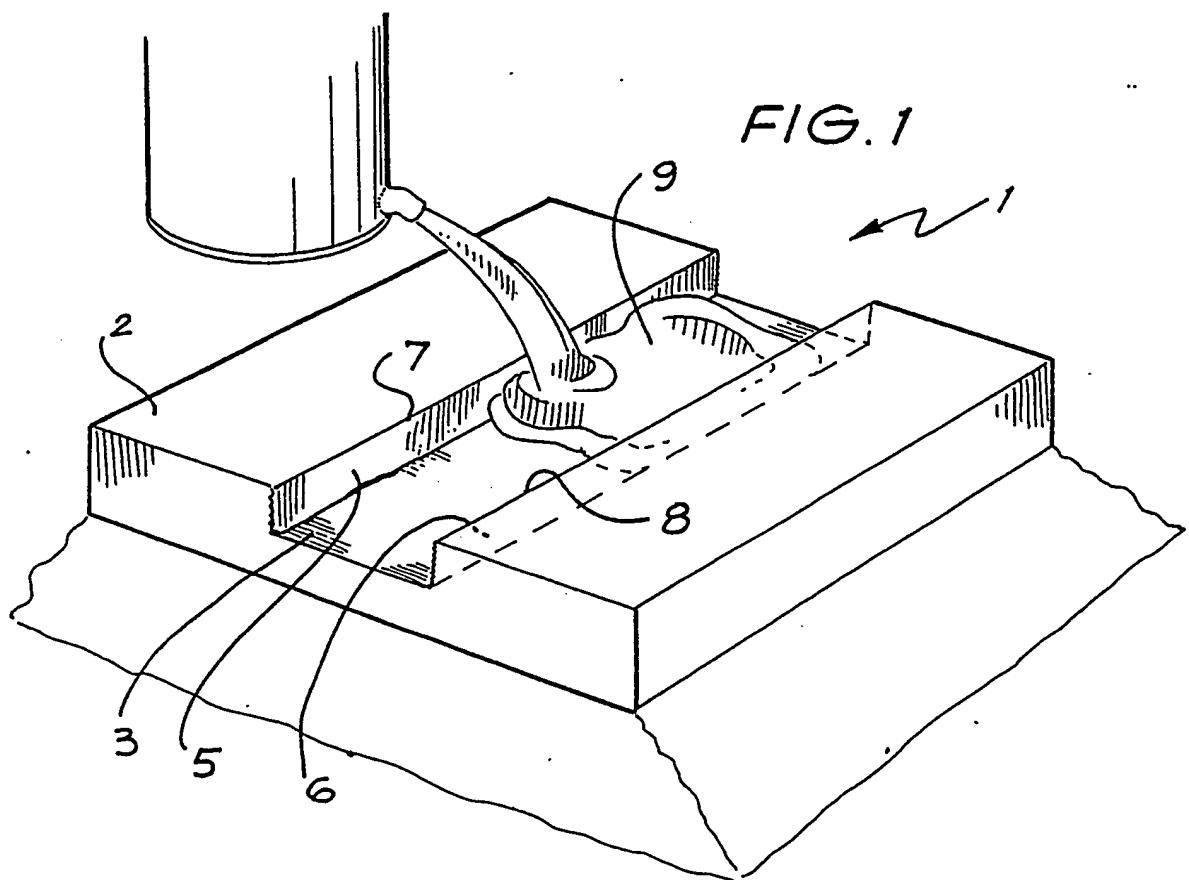
13. A method of marking according to claim 12, wherein the cross sectional profile of the said recess is curvilinear.

14. A method of marking according to claim 13, wherein the base of the said recess is adapted with an additional recess to provide a key for said filler material.

15. A method of marking according to claim 14, wherein the outside surface of the filler material sits proud of, flush with or below the outside surface of the substrate material.

16. A method of marking as hereinbefore described with reference to the accompanying illustrations.

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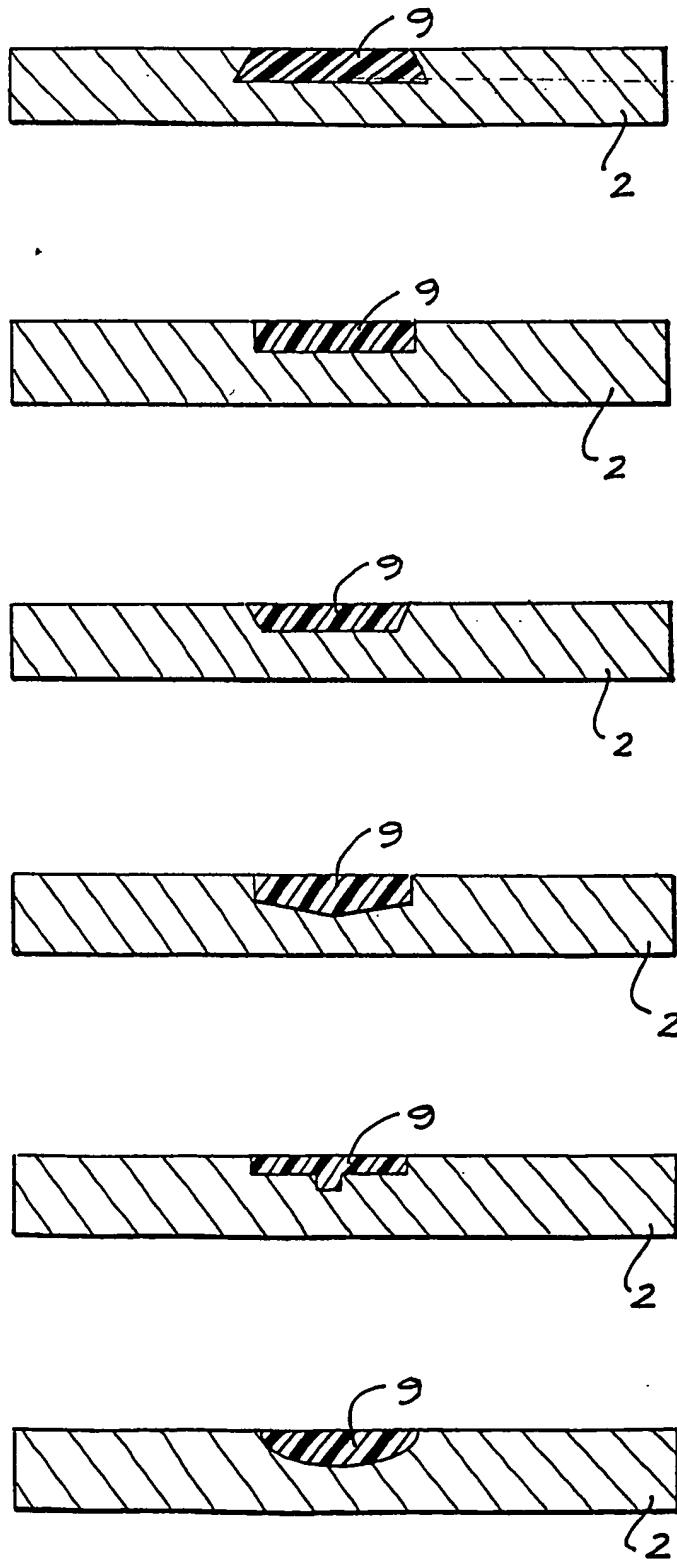


FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 86/00327

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all)

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl. ⁴ E01F 9/08

II. FIELDS SEARCHED

Minimum Documentation Searched¹

Classification System	Classification Symbols
IPC	E01F 9/00, 9/04, 9/08, E01C 23/02, 23/16

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched²

AU: IPC as above; IPC E01C 11/10, 23/09

III. DOCUMENTS CONSIDERED TO BE RELEVANT³

Category ⁴	Citation of Document, ⁵ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No ¹³
A	CH,B, 488868 (STEVANON) 29 May 1970 (29.05.70)	(1)
A	EP,A, 74731 (DOW CORNING CORPORATION) 23 March 1983 (23.03.83)	(1)
A	EP,A, 642 (THORMACK SEALANTS LIMITED) 7 February 1979 (07.02.79)	(1)
A	JP,A, 52042631 (KYOWA DENKI KAGAKU) 2 April 1977 (02.04.77) (Derwent English Language abstract 80-52637C/30)	(1)
A	US,A, 2355430 (FLOOD) 8 August 1944 (08.08.44)	(1)
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IV. CERTIFICATION

Date of the Actual Completion of the International Search

16 December 1986 (16.12.86)

Date of Mailing of this International Search Report

(13.01.87) 13 JANUARY 1987

International Searching Authority

Australian Patent Office

Signature of Authorized Officer

J. M. SELLARS